

Reliable High-Speed Storage enables Groundbreaking Research

For High Performance Computing, storage offload and protection are essential to enable application scaling

Introduction

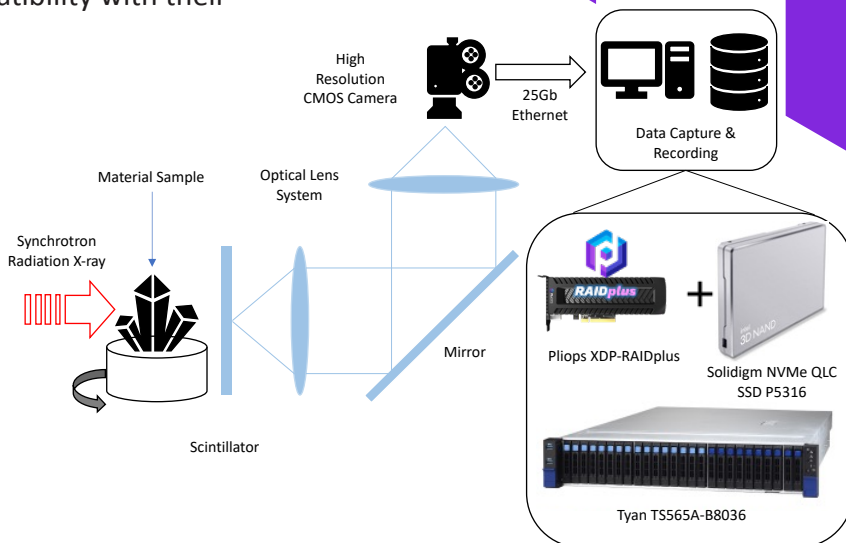
Riken SPring-8 is a state-of-the-art science technology center located in Hyogo, Japan. It uses synchrotron radiation to analyze the structural properties of materials at an atomic level. The analysis is then applied in life science, material science, chemistry, medicine, and other industrial use cases. The radiation system utilizes a high-resolution X-ray camera to capture the radiograph images sequentially. These captured images are reconstructed to high-resolution tomographic images at a sub-micrometer level by acquiring and analyzing the necessary datasets.

Challenge

The tomographic image accuracy is heavily dependent on the image resolution of the X-ray cameras used. While X-Ray cameras have increased the number of pixels and frame rate, Riken SPring-8 have been unable to utilize the higher resolution due to the current storage constraints of increased data bandwidth and size without dropping frames. They were looking for a high-capacity storage solution which has consistent high-speed write performance to store all the captured image data without dropping any frames. Other requirements Riken SPring-8 needed included low power utilization, protection of the data with high Peta Bytes Written (PBW) class endurance and compatibility with their current Linux version and libraries used.

Solution

To increase the accuracy, Riken SPring-8 had to significantly increase the X-ray camera capture resolution and frame rate to 5328 (W) x 4608 (H), 73 fps while simultaneously increasing the number of high-resolution images being captured. This is the heaviest capture bandwidth of the camera.



Riken SPring-8 tested a storage system using the Pliops XDP-RAIDplus in conjunction with Solidigm QLC NVMe SSDs for their imaging requirements. The evaluation configuration details are described in the table below.

Accelerator Card	Pliops XDP-RAIDplus PCIe x8 form factor Low Profile HHHL (6.6" x 2.536")
Storage	Solidigm P5316 QLC NVMe SSD 15.36 TB x 8 drives
Server	Tyan Transport SX TS65A-B8036 2U Single Socket 12 SATA + 16 NVMe Hybrid Storage Server
CPU	AMD EPYC 7543P
Memory	512GB
OS	Ubuntu 20.04.01
Kernel	5.8.0.50
Camera	Emergent Vision Technology, 25 GbE
NIC	Nvidia 25 GbE with Rivermax

The test results showed that the Pliops XDP-RAIDplus (RAID 5 configuration) was able to provide the steady state performance needed (27 Gb/s write) at the maximum resolution and frame rate not only during their regular operation, but also during drive rebuild with no dropped frames.

Results

Riken SPring-8 have evaluated the Pliops XDP-RAIDplus based solution and found that its performance fulfilled their imaging requirements of wide bandwidth camera capture without any dropped frames. These results will increase the resolution of their tomographic imaging system and accelerate the creation of scientific results.

Their imaging systems are scheduled to be updated with the XDP-RAIDplus card shortly.

The XDP-RAIDplus storage solution has improved the overall storage density, endurance, availability and TCO.

To schedule your own XDP-RAIDplus evaluation, please reach out to demo@pliops.com
Learn more about XDP-RAIDplus at pliops.com/raidplus

About Pliops

Pliops multiplies the effectiveness of organizations' infrastructure investments by exponentially increasing datacenter performance, reliability, capacity, and efficiency. Founded in 2017 and named as one of the 10 hottest semiconductor startups by CRN in 2020 and 2021. Pliops global investors include NVIDIA, Intel Capital, SoftBank, Western Digital, KDT, and Xilinx. **Learn more at www.pliops.com**

Key Solution Benefits

- High sustained I/O performance:
 - 30GB/s sequential read
 - 6GB/s sequential write
- SSD Write Amplification Factor reduced to 1.03
- No application impact even during drive rebuild
- Significant improvement in drive rebuild times
- Use Solidigm QLC NVMe SSD with the effective endurance of TLC
- Maximize application CPU Utilization by offloading compression
- RAID 5 like protection with no capacity penalties
- Low profile form factor
- Low power consumption
- No dedicated hot spare required with Virtual Hot Capacity (VHC) feature